UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/823,935	03/30/2001	James R. Peterson	500891.01	7586

27076 7590 01/09/2007

DORSEY & WHITNEY LLP
INTELLECTUAL PROPERTY DEPARTMENT
SUITE 3400
1420 FIFTH AVENUE
SEATTLE, WA 98101

EXAMINER	
WANG, JIN CHENG	
ART UNIT	**PAPER NUMBER**
2628	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	09/823,935	PETERSON ET AL.	
	Examiner	Art Unit	
	Jin-Cheng Wang	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,14-32,41-48,86,88 and 91* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6, 14-32, 41-48, 86, 88 and 91* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 11/13/06
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's arguments filed 11/13/2006 have been considered.

Applicant's submission filed on 7/3/2006 has been entered. Claims 1, 3, 4, 14, 15, 41, 42, and 86 have been amended. Claims 7-13, 33-40, 49-85, 87, 89-90 and 92-97 have been canceled. Claims 1-6, 14-32, 41-48, 86, 88 and 91 are pending in the application.

Response to Arguments

Applicant's arguments, filed 7/3/2006 and 11/13/2006 have been considered, but are moot in view of the new ground(s) of rejection set forth below.

Applicant argues that Sato does not teach the claim limitations set forth in the claim 1. The Examiner cannot concur, for the reasons set forth in the present Office Action.

Applicant's arguments with respect to claims 1-32, 41-48, 63-86, 88 and 91 have been considered but are moot in view of the new ground(s) of rejection based on Sato et al. U.S. Pat. No. 6,731,301.

Applicant argues in essence with respect to the claim limitation of "calculating less than three sample values for a pixel" set forth in the claim 1. However, Sato teaches this claim limitation. At column 12, lines 49-53 and column 13, lines 25-35, Sato teaches 4 × 4 stamp by super sampling P × P subpixels per one stamp of 4×4 subpixels with $P = 2^n$. For n = 0, the 1 ×1 super sampling only samples one subpixel per stamp of 4 × 4 subpixels. At column 13, lines 25-53 and column 14, lines 28-35, Sato teaches P × P sparse sampling while the stamp is composed of M × N subpixels and thus disclosing 1 × 1 sparse sampling in a stamp of 4 × 4 subpixels. Sato

further discloses selecting several points from the samples and thus disclosing selecting and calculating less than three sample locations relative to a pixel. See column 15, lines 30-37 wherein the number of subpixels in the stamp exceeds the number of sampling subpixels for the case N > P. Thus, the claim limitation of calculating less than three sample values for a pixel is taught in many different contexts by Sato.

Moreover, in another context of super-sampling, Sato teaches calculating four sample values for pixels of an image in accordance with a sampling pattern for each pixel (per stamp) comprising calculating one sample value, two sample values in a loop of actions. Moreover, Sato teaches that four samples are available for calculation. This does not mean all four samples have to be always calculated. Sato may only have to calculate less than four sample values. Therefore, Sato implicitly teaches the claim limitation of "calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel. Sato has four samples for each pixel and Sato's calculation comprises calculating the first sample for each pixel, followed by calculating the second sample for each pixel and stop there without calculating the remaining sample values, or calculating the remaining samples at a later time.

Moreover, samples are calculated on a one-by-one basis either consecutively or pair-wise simultaneously, in whatever manner. Sato does not have to calculate all four samples even though all four samples are available for a pixel. Applicant's claim limitation does not recite "calculating only two sample values for each pixel wherein each pixel only has two samples". The claim limitation of "calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel" set forth in the claim 1 is subject to the broadest interpretation consistent with applicant's specification.

During patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See In re Morris, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). See MPEP § 2111 - § 2116.01, for case law pertinent to claim analysis. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. In re Morris, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. E-Pass Techs., Inc. v. 3Com Corp., 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted "in view of the specification" without importing limitations from the specification into the claims unnecessarily). In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also In re Zletz, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) ("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow.... The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process."). A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

Therefore, in view of Sato, having four samples available, Sato can choose any of the samples for the calculation of a value for the pixel, including calculating less than three samples for a pixel. Thus, the claim limitation of calculating less than three sample values for a pixel is taught by Sato.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-6, 14-32, 41-48, 86, 88 and 91 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1-6, 14-32, 41-48:

Claim 1 recites "a method for calculating values for pixels of an image, comprising: calculating…; and determining…" Claim 1 is a computer program *per se*. Computer program per se is neither computer components nor statutory process. Thus, claim 1 is non-statutory.

Additionally, since claim 1 includes a 101 judicial exception, claim 1 must be for a practical application of the judicial exception. As is, claim 1 failed to recite either a physical transformation or produces a useful and tangible result. Thus, claim 1 is also non-statutory for this reason.

Claims 5-6, 14-32 and 41-48 are non-statutory for the same reasons discussed above.

Claims 86, 88 and 91:

Claim 86 applies a computer program as part of a seemingly patentable apparatus, however, claim 86 in reality seeks patent protection for the computer program. Computer program per se is neither computer components nor statutory process. Thus, claim 86 is non-statutory.

Additionally, since claim 86 includes a 101 judicial exception, claim 86 must be for a practical application of the judicial exception. As is, claim 86 failed to recite either a physical transformation or produces a useful and tangible result. Thus, claim 86 is also non-statutory for this reason.

Claims 88 and 91 are non-statutory for the same reasons discussed above.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 41-48, 88 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant

art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

For example, the base claim 41 recites, "a pixel considered as divided evenly into **a four-by-four array** of sub-regions each sampling pattern having less than three sample locations relative to a pixel, each sample location located at one of four candidate sampling locations."

However, applicant's specification does not disclose selecting two sample locations from **four candidate sampling locations**. See Figs. 5a and 5b wherein only two sample locations are selected from two candidate sampling locations, or 16 candidate sampling locations. There is no indication of four candidate sampling locations. See also Figs. 8-9 wherein four sample locations are selected from the four candidate locations or four sample locations are selected from the 4 by 4 subpixels for each pixel. There is no indication of *less than three sample locations*. Figs 5a and 5b represent different embodiments of sampling pattern than those of Figs. 8-9 and cannot possibly be combined.

Therefore, these claim limitations set forth in the claim 41 are not described in the specification in such a way that as to reasonably convey to one of the ordinary skill in art had possession of the claimed invention.

To comply with the "written description" requirement of 35 U.S.C. 112, first paragraph, an applicant must convey with reasonable clarity to those skilled in the art that, as of the filling date sought, he or she was in possession of the invention. The invention is, for purposes of the "written description" inquiry, whatever is now claimed. Vas-Cath, Inc. v. Mahurkar, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). For purposes of written description, one shows "possession" by descriptive means such as words, structures, figures, diagrams, and

formulas that fully set forth the claimed invention. Lockwood v. American Airlines, Inc., 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997). Such descriptive means cannot be found in the disclosure for the inventions of the base claim 41.

Claim 42 is subject to the same rationale of rejection set forth in the claim 41.

The claims 43-48 depend upon the claim 42 and are rejected due to their dependency on the claim 42.

The claim 88 depends upon the claim 86 while the base claim 86 is amended to recite, "sampling at only two sample locations relative to a pixel" and the claim 88 recites "a sampling pattern is considered as dividing a given pixel into a four-by-four array of sub-pixels" and "four potential sampling positions".

However, **applicant's specification does not describe a combination of these limitations in a single embodiment**. Therefore, these claim limitations set forth in the claim 88 are not described in the specification in such a way that as to reasonably convey to one of the ordinary skill in art had possession of the claimed invention.

To comply with the "written description" requirement of 35 U.S.C. 112, first paragraph, an applicant must convey with reasonable clarity to those skilled in the art that, as of the filling date sought, he or she was in possession of the invention. The invention is, for purposes of the "written description" inquiry, whatever is now claimed. Vas-Cath, Inc. v. Mahurkar, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). For purposes of written description, one shows "possession" by descriptive means such as words, structures, figures, diagrams, and formulas that fully set forth the claimed invention. Lockwood v. American Airlines, Inc., 107

F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997). Such descriptive means cannot be found in the disclosure for the inventions of the base claim 88.

Due to the 112 rejection to the claims set forth in above, the prior art rejection of the claims 41-48 and 88 are based on the claim limitations best understood by the Examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 23-28 and 91 are rejected under 35 U.S.C. 102(e) as being anticipated by Sato et al. U.S. Pat. No. 6,731,301 (hereinafter Sato).

Claim 23:

(1) Sato teaches a method for calculating values for pixels of an image having the pixels arranged in rows and columns parallel to first and second perpendicular axes, respectively, comprising:

Calculating sample values for pixels of the image in accordance with a plurality of sampling rates, the sampling rate differing for at least two pixels of the image (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the vertical direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the*

predetermined condition. ***Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table;*** *see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14; moreover, Fig. 32 also shows two sampling rates for pixels along the y-axis wherein each pixel has 2 by 2 matrix of sub-pixels*); and

Calculating values for pixels of the image from a respective calculated sample values (*see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 24:

The claim 24 encompasses the same scope of invention as that of claim 23 except additional claimed limitation of the sampling rate alternating per pixel for consecutive pixels along lines parallel to one or the other axes of the image for at least some of the horizontal or vertical lines of pixels of the image.

However, Sato further discloses the claimed limitation of the sampling rate alternating per pixel for consecutive pixels along lines parallel to one or the other axes of the image for at least some of the horizontal or vertical lines of pixels of the image (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the y-direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

Claim 25:

The claim 25 encompasses the same scope of invention as that of claim 23 except additional claimed limitation of the sampling rate being constant for the pixels arranged along any given line parallel to the first axis and varies among the plurality of sampling rates for the pixels arranged along any given line parallel to the second axis.

However, Sato further discloses the claimed limitation of the sampling rate being constant for the pixels arranged along any given line parallel to the first axis and varies among the plurality of sampling rates for the pixels arranged along any given line parallel to the second axis (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the y-direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

Claim 26:

The claim 26 encompasses the same scope of invention as that of claim 25 except additional claimed limitation of the first and second sampling rates alternating per pixel for consecutive pixels in any line parallel to the second axis.

However, Sato further discloses the claimed limitation of the first and second sampling rates alternating per pixel for consecutive pixels in any line parallel to the second axis (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the y-direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the*

predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14).

Claim 27:

(1) Sato teaches a method for calculating values for pixels of an image having the pixels arranged in rows and columns parallel to first and second perpendicular axes, respectively, comprising:

Calculating sample values for pixels of the image in accordance with first and second sampling rates, the sampling rate remaining constant for consecutive pixels arranged along any one given line parallel to the first axis and varying between the first and second sampling rates for consecutive pixels arranged along any one given line parallel to the second axis (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the vertical direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition.* ***Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table;*** *see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14; moreover, Fig. 32 also shows two sampling rates for pixels along the y-axis wherein each pixel has 2 by 2 matrix of sub-pixels; SEE ALSO FIG. 34 for the plurality of pixels along the y-axis wherein the column of pixels are sampled at different rates*); and

Calculating values for pixels of the image from a respective calculated sample values (*see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 28:

The claim 28 encompasses the same scope of invention as that of claim 27 except additional claimed limitation of the pixels of the image being arranged in rows parallel to the first axis and columns parallel to the second axis, and the first and second sampling rates alternating every row of pixels. However, Sato further discloses the claimed limitation of the pixels of the image being arranged in rows parallel to the first axis and columns parallel to the second axis, and the first and second sampling rates alternating every row of pixels (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the y-direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34-36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

Claim 91:

The claim 91 encompasses the same scope of invention as set forth in claim 27 except additional claimed limitation of an apparatus for rendering of an image. However, Sato further discloses the claimed limitation of an apparatus for rendering of an image (*see Figs. 2-22*).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-6, 14-22, 41-48, and 86 are rejected under 35 U.S.C. 102(e) as being anticipated by Sato et al. U.S. Pat. No. 6,731,301 (hereinafter Sato).

Claim 1:

(1) Sato teaches a method for calculating values for pixels of an image, comprising:

Calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel, the sampling pattern for consecutive pixels alternating between a first and a second sampling pattern, wherein the calculation includes calculating a pair of sample values for pixels of an image in accordance with a sampling pattern for each pixel (*Sato teaches sampling patterns for adjacent pixels wherein the sampling patterns alternate between two different patterns selected from the pattern table for a plurality of pixels in an image and calculating four sample values for pixels of an image comprising calculating less than three sample values for pixels of an image; see Figs. 26, 29, 34, 36, and 38*); each sampling pattern defining one or more sampling locations at which sample values are calculated, the sampling locations being relative to a pixel (*e.g., Sato teaches each sampling pattern having sample*

locations arranged within a 4 by 4 sub-pixel matrix relative to a pixel; Figs. 24-38; col. 2, 4, 8, 11-12; 13-14); and

Determining a value for at least one pixel by combining sample values calculated for the sampling locations for the pixel (*e.g., Sato teaches determining the pixel values from the sample locations to avoid anti-aliasing effect; Figs. 24-38; col. 2, 4, 8-10, 11-12; 13-14*).

Sato teaches calculating four sample values for pixels of an image in accordance with a sampling pattern for each pixel comprising calculating one sample value, two sample values in a loop of actions. Moreover, Sato teaches that four samples are available for calculation. This does not mean all four samples have to be always calculated. Sato may only have to calculate less than four sample values. Therefore, Sato implicitly teaches the claim limitation of "calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel. Sato has four samples for each pixel and Sato's calculation comprises calculating the first sample for each pixel, followed by calculating the second sample for each pixel and stop there without calculating the remaining sample values, or calculating the remaining samples at a later time.

Moreover, samples are calculated on a one-by-one basis either consecutively or pair-wise simultaneously, in whatever manner. Sato does not have to calculate all four samples even though all four samples are available for a pixel. Applicant's claim limitation does not recite "calculating only two sample values for each pixel wherein each pixel only has two samples". The claim limitation of "calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel" set forth in the claim 1 is subject to the broadest interpretation consistent with applicant's specification.

During patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See In re Morris, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). See MPEP § 2111 - § 2116.01, for case law pertinent to claim analysis. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. In re Morris, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. E-Pass Techs., Inc. v. 3Com Corp., 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted "in view of the specification" without importing limitations from the specification into the claims unnecessarily). In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also In re Zletz, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) ("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow.... The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process."). A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

Therefore, in view of Sato, having four samples available, Sato can choose any of the samples for the calculation of a value for the pixel, including calculating less than three samples for a pixel. Thus, the claim limitation of calculating less than three sample values for a pixel is taught by Sato.

Moreover, at column 12, lines 49-53 and column 13, lines 25-35, Sato teaches 4 × 4 stamp by super sampling P × P subpixels per one stamp of 4×4 subpixels with $P = 2^n$. For n = 0, the 1 ×1 super sampling only samples one subpixel per stamp of 4 × 4 subpixels. At column 13, lines 25-53 and column 14, lines 28-35, Sato teaches P × P sparse sampling while the stamp is composed of M × N subpixels and thus disclosing 1 × 1 sparse sampling in a stamp of 4 × 4 subpixels. Sato further discloses selecting several points from the samples and thus disclosing selecting and calculating less than three sample locations relative to a pixel. See column 15, lines 30-37, wherein the number of subpixels in the stamp exceeds the number of sampling subpixels for the case N > P. Thus, the claim limitation of calculating less than three sample values for a pixel is taught in many different contexts by Sato.

Claim 2:

The claim 2 encompasses the same scope of invention as that of claim 1 except additional claimed limitation that each sampling pattern defines two sample locations and calculating sample values comprises calculating a pair of sample values whenever sample values for a pixel are calculated in accordance with the first or second sampling pattern, the sampling patterns alternating from one pixel to the next.

However, Sato further discloses the claimed limitation that each sampling pattern defines two sample locations and calculating sample values comprises calculating a pair of sample values whenever sample values for a pixel are calculated in accordance with the first or second sampling pattern, the sampling patterns alternating from one pixel to the next (*at least two sampling locations are defined and calculated for each sampling pattern in accordance with the first or second sampling pattern; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 3:

The claim 3 encompasses the same scope of invention as that of claim 2 except additional claimed limitation that the pixels of the image are arranged along rows and columns parallel to first and second perpendicular axes, respectively, and the pair of sample locations per sampling pattern for at least two pixels are arranged along a line parallel to neither axis.

However, Sato further discloses the claimed limitation that the pixels of the image are arranged along rows and columns parallel to first and second perpendicular axes, respectively, and the pair of sample locations per sampling pattern for at least two pixels are arranged along a line parallel to neither axis (*e.g., the horizontal and vertical axes are in parallel with the rows and columns of the pixels and a diagonal line of the 4 by sub-pixel matrix; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 4:

The claim 4 encompasses the same scope of invention as that of claim 2 except additional claimed limitation of calculating a pair of sample values comprises calculating sample values at sample positions arranged according to either a first or second sample pattern, the first sampling pattern having sample positions on opposite sides of a line parallel to a first axis and dividing a

respective pixel region in two, and the second sampling pattern having sample positions on opposite sides of a line parallel to a second axis and dividing a respective pixel region in two, the second axis perpendicular to the first axis.

However, Sato further discloses the claimed limitation that calculating sample values at sample positions arranged according to either a first or second sample pattern, the first sampling pattern having sample positions on opposite sides of a line parallel to a first axis and dividing a respective pixel region in two, and the second sampling pattern having sample positions on opposite sides of a line parallel to a second axis and dividing a respective pixel region in two, the second axis perpendicular to the first axis (*the first axis is the x-axis and the second axis is the y-axis. Samples are distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the x-axis and the middle line. Samples are also distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the y-axis; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 5:

The claim 5 encompasses the same scope of invention as that of claim 4 except additional claimed limitation of the two lines parallel to the respective axes pass through the centers of respective pixels. However, Sato further discloses the claimed limitation that the pixels of the two lines parallel to the respective axes pass through the centers of respective pixels (*the first axis is the x-axis and the second axis is the y-axis. Samples are distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the x-axis and the middle line. Samples are also distributed on the two regions separated by the middle line of the 4 by 4*

sub-pixel matrix parallel to the y-axis; *see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 6:

The claim 6 encompasses the same scope of invention as that of claim 5 except additional claimed limitation that each sampling pattern has a sample position on each side of both of two lines parallel to respective axes and passing through the center of respective pixels.

However, Sato further discloses the claimed limitation that each sampling pattern has a sample position on each side of both of two lines parallel to respective axes and passing through the center of respective pixels (*the first axis is the x-axis and the second axis is the y-axis. Samples are distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the x-axis and the middle line. Samples are also distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the y-axis;* *see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 14:

Sato teaches a method for generating an image having pixels arranged in rows and columns parallel to first and second perpendicular axes, respectively, comprising:

Calculating less than three sample values for pixels of the image in accordance with a plurality of sampling patterns, one sampling pattern per pixel, one pair of sampling points per sampling pattern (*Sato discloses calculating pairs of sample values for pixels in accordance to the at least two different sampling patterns* *see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*); and

Calculating a value for at least one pixel of the image from a respective pair or pairs of calculated sample values (*Sato discloses determining the pixel values from the four sample locations for each pixel see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Sato teaches calculating four sample values for pixels of an image in accordance with a sampling pattern for each pixel comprising calculating one sample value, two sample values in a loop of actions. Moreover, Sato teaches that four samples are available for calculation. This does not mean all four samples have to be always calculated. Sato may only have to calculate less than four sample values. Therefore, Sato implicitly teaches the claim limitation of "calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel. Sato has four samples for each pixel and Sato's calculation comprises calculating the first sample for each pixel, followed by calculating the second sample for each pixel and stop there without calculating the remaining sample values, or calculating the remaining samples at a later time.

Moreover, samples are calculated on a one-by-one basis either consecutively or pair-wise simultaneously, in whatever manner. Sato does not have to calculate all four samples even though all four samples are available for a pixel. Applicant's claim limitation does not recite "calculating only two sample values for each pixel wherein each pixel only has two samples". The claim limitation of "calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel" set forth in the claim 1 is subject to the broadest interpretation consistent with applicant's specification.

During patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See In re Morris, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir.

1997). See MPEP § 2111 - § 2116.01, for case law pertinent to claim analysis. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. In re Morris, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. E-Pass Techs., Inc. v. 3Com Corp., 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted "in view of the specification" without importing limitations from the specification into the claims unnecessarily). In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also In re Zletz, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) ("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow.... The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process."). A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

Therefore, in view of Sato, having four samples available, Sato can choose any of the samples for the calculation of a value for the pixel, including calculating less than three samples

for a pixel. Thus, the claim limitation of calculating less than three sample values for a pixel is taught by Sato.

Moreover, at column 12, lines 49-53 and column 13, lines 25-35, Sato teaches 4 × 4 stamp by super sampling P × P subpixels per one stamp of 4×4 subpixels with $P = 2^n$. For n = 0, the 1 ×1 super sampling only samples one subpixel per stamp of 4 × 4 subpixels. At column 13, lines 25-53 and column 14, lines 28-35, Sato teaches P × P sparse sampling while the stamp is composed of M × N subpixels and thus disclosing 1 × 1 sparse sampling in a stamp of 4 × 4 subpixels. Sato further discloses selecting several points from the samples and thus disclosing selecting and calculating less than three sample locations relative to a pixel. See column 15, lines 30-37, wherein the number of subpixels in the stamp exceeds the number of sampling subpixels for the case N > P. Thus, the claim limitation of calculating less than three sample values for a pixel is taught in many different contexts by Sato.

Claim 15:

The claim 15 encompasses the same scope of invention as that of claim 14 except additional claimed limitation that a first sampling pattern defines sample positions relative to a given pixel on opposite sides of a line parallel to a first axis of the image and dividing the respective pixel in two, and a second sampling pattern defines sample positions relative to a given pixel on opposite sides of a line parallel to a second axis of the image and dividing the respective pixel in two.

However, Sato further discloses the claimed limitation of that a first sampling pattern defines sample positions relative to a given pixel on opposite sides of a line parallel to a first axis

of the image and dividing the respective pixel in two, and a second sampling pattern defines sample positions relative to a given pixel on opposite sides of a line parallel to a second axis of the image and dividing the respective pixel in two (*the first axis is the x-axis and the second axis is the y-axis. Samples are distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the x-axis and the middle line. Samples are also distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the y-axis; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 16:

The claim 16 encompasses the same scope of invention as that of claim 15 except additional claimed limitation that the second sampling pattern comprises a sampling pattern substantially corresponding to the first sampling pattern rotated 90 degree.

However, Sato further discloses the claimed limitation that that the second sampling pattern comprises a sampling pattern substantially corresponding to the first sampling pattern rotated 90 degree (*Sato discloses selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

Claim 17:

The claim 17 encompasses the same scope of invention as that of claim 15 except additional claimed limitation that the sampling patterns alternate per pixel along at least one row or column of pixels.

However, Sato further discloses the claimed limitation that the sampling patterns alternate per pixel along at least one row or column of pixels (*Sato discloses the sampling patterns alternating for adjacent pixels along a row or column of pixels in an image; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 18:

The claim 18 encompasses the same scope of invention as that of claim 15 except additional claimed limitation that each of the two sampling patterns is applied to every other pixel along at least one row or column of pixels, the second sampling pattern substantially corresponding to the first sampling pattern rotated 90 degrees.

However, Sato further discloses the claimed limitation that each of the two sampling patterns is applied to every other pixel along at least one row or column of pixels, the second sampling pattern substantially corresponding to the first sampling pattern rotated 90 degrees (*Sato discloses selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

Claim 19:

The claim 19 encompasses the same scope of invention as that of claim 15 except additional claimed limitation that the sampling pattern for each consecutive pixel alternates along a row or column of pixels between a given sampling pattern and its 90 degrees-rotated counterpart.

However, Sato further discloses the claimed limitation that the sampling pattern for each consecutive pixel alternates along a row or column of pixels between a given sampling pattern and its 90 degrees-rotated counterpart (*Sato discloses selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

Claim 20:

The claim 20 encompasses the same scope of invention as that of claim 15 except additional claimed limitation that all sampling patterns are considered as dividing the regions of respective pixels into the same four-by-four array of sub-regions and four potential sample positions are arranged within the array in a manner whereby no two potential sample positions are located in the same row, column, or diagonal of sub-regions, the plurality of sampling patterns comprising first and second sampling patterns, each defining two sampling positions from the four potential sampling positions, the first sampling pattern having sample locations in the first and fourth rows of the array and the second sampling pattern having sample locations in the second and third rows of the array.

However, Sato further discloses the claimed limitation that all sampling patterns are considered as dividing the regions of respective pixels into the same four-by-four array of sub-regions and four potential sample positions are arranged within the array in a manner whereby no two potential sample positions are located in the same row, column, or diagonal of sub-regions, the plurality of sampling patterns comprising first and second sampling patterns, each defining two sampling positions from the four potential sampling positions, the first sampling pattern having sample locations in the first and fourth rows of the array and the second sampling pattern having sample locations in the second and third rows of the array (*the first axis is the x-axis and the second axis is the y-axis. Samples are distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the x-axis and the middle line. Samples are also distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the y-axis; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 21:

The claim 21 encompasses the same scope of invention as that of claim 14 except additional claimed limitation of the sampling pattern alternating per pixel along at least one row or column of pixels. However, Sato further discloses the claimed limitation of the sampling pattern alternating per pixel along at least one row or column of pixels (*Sato discloses the sampling patterns alternating for adjacent pixels along a row or column of pixels in an image; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 22:

The claim 22 encompasses the same scope of invention as that of claim 14 except additional claimed limitation of each of the two sampling patterns being applied to every other

pixel along at least one row or column of pixels, the second sampling pattern substantially corresponding to the first sampling pattern rotated 90 degrees. However, Sato further discloses the claimed limitation of each of the two sampling patterns being applied to every other pixel along at least one row or column of pixels, the second sampling pattern substantially corresponding to the first sampling pattern rotated 90 degrees (*Sato discloses selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

Claim 41:

Sato teaches a method for calculating values for pixels of an image having its pixels arranged in rows and columns parallel to first and second perpendicular axes, respectively, comprising:

Calculating sample values for pixels of the image in accordance with one or more sample patterns (e.g., the sample patterns are different because the sampling locations are different from pixels in the same row. The sampling patterns are different because the sampling rates are different from pixels in the same column. Fig. 31 of Sato discloses one sample pattern, Fig. 32 discloses another sample pattern and Fig. 35 discloses two sample patterns), the region of potential sampling locations relative to a pixel considered as divided evenly into a four-by-four array of sub-regions each sampling pattern having less than three sample locations relative to a

pixel (*e.g., at column 12, lines 49-53 and column 13, lines 25-35, Sato teaches 4 × 4 stamp by super sampling P × P subpixels per one stamp of 4×4 subpixels with P = 2^n. For n = 0, the 1 ×1 super sampling only samples one subpixel per stamp of 4 × 4 subpixels. At column 13, lines 25-53 and column 14, lines 28-35, Sato teaches P × P sparse sampling while the stamp is composed of M × N subpixels and thus disclosing 1 × 1 sparse sampling in a stamp of 4 × 4 subpixels. Sato further discloses selecting several points from the samples and thus disclosing selecting less than three sample locations relative to a pixel. See column 15, lines 30-37 wherein the number of subpixels in the stamp exceeds the number of sampling subpixels for the case N > P. Thus, the claim limitation of calculating less than three sample values for a pixel is taught by Sato in any of these contexts*), each sample location located at one of four candidate sampling locations, and the candidate sampling locations arranged in a manner whereby no two of the four candidate sample locations for a given sampling pattern are located along the same row, column, or diagonal of sub-regions, at least one sampling pattern including at least one other sampling location not located in one of the candidate sampling locations, no more than seven sub-regions containing any sampling location (see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14); and

Calculating values for pixels of the image from sample values calculated from respective pixels (*see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Sato implicitly teaches the claim limitation, "the sampling pattern having less than three sample locations relative to a pixel" within "calculating sample values for pixels of the image in accordance with a sampling pattern, the region of potential sampling locations relative to a pixel considered as divided evenly into a four-by-four array of sub-regions, the sampling pattern

having less than three sample locations relative to a pixel, each sample location located at one of four candidate sampling locations."

Sato teaches calculating four sample values for pixels of an image in accordance with a sampling pattern for each pixel comprising calculating one sample value, two sample values in a loop of actions. Moreover, Sato teaches that four samples are available for calculation. This does not mean all four samples have to be always calculated. Sato may only have to calculate less than four sample values. Therefore, Sato implicitly teaches the claim limitation of "calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel. Sato has four samples for each pixel and Sato's calculation comprises calculating the first sample for each pixel, followed by calculating the second sample for each pixel and stop there without calculating the remaining sample values, or calculating the remaining samples at a later time.

Moreover, samples are calculated on a one-by-one basis either consecutively or pair-wise simultaneously, in whatever manner. Sato does not have to calculate all four samples even though all four samples are available for a pixel. Applicant's claim limitation does not recite "calculating only two sample values for each pixel wherein each pixel only has two samples". The claim limitation of "calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel" set forth in the claim 1 is subject to the broadest interpretation consistent with applicant's specification.

During patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See In re Morris, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). See MPEP § 2111 - § 2116.01, for case law pertinent to claim analysis. Office personnel

are to give claims their broadest reasonable interpretation in light of the supporting disclosure. In re Morris, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. E-Pass Techs., Inc. v. 3Com Corp., 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted "in view of the specification" without importing limitations from the specification into the claims unnecessarily). In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also In re Zletz, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) ("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow.... The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process."). A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

Therefore, in view of Sato, having four samples available, Sato can choose any of the samples for the calculation of a value for the pixel, including calculating less than three samples for a pixel. Thus, the claim limitation of calculating less than three sample values for a pixel is taught by Sato.

Moreover, at column 12, lines 49-53 and column 13, lines 25-35, Sato teaches 4 × 4 stamp by super sampling P × P subpixels per one stamp of 4×4 subpixels with $P = 2^n$. For n = 0, the 1 ×1 super sampling only samples one subpixel per stamp of 4 × 4 subpixels. At column 13, lines 25-53 and column 14, lines 28-35, Sato teaches P × P sparse sampling while the stamp is composed of M × N subpixels and thus disclosing 1 × 1 sparse sampling in a stamp of 4 × 4 subpixels. Sato further discloses selecting several points from the samples and thus disclosing selecting and calculating less than three sample locations relative to a pixel. See column 15, lines 30-37, wherein the number of subpixels in the stamp exceeds the number of sampling subpixels for the case N > P. Thus, the claim limitation of calculating less than three sample values for a pixel is taught in many different contexts by Sato.

Claim 42:

The claim 42 is subject to the same rationale of rejection set forth in the claim 41.

Claim 43:

The claim 43 encompasses the same scope of invention as that of claim 42 except additional claimed limitation of the two sample locations located in the first and fourth rows of the array of sub-regions.

However, Sato further discloses the claimed limitation of the two sample locations located in the first and fourth rows of the array of sub-regions (*see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 44:

The claim 44 encompasses the same scope of invention as that of claim 43 except additional claimed limitation of the two sample locations located substantially at the center of respective sub-regions. However, Sato further discloses the claimed limitation of the two sample locations located substantially at the center of respective sub-regions (*e.g., each sub-pixel sample area forms a sub-region and therefore each sampling location lies at the center of a sub-region; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 45:

The claim 45 encompasses the same scope of invention as that of claim 43 except additional claimed limitation of the two sample locations located at the center of respective sub-regions. However, Sato further discloses the claimed limitation of the two sample locations located at the center of respective sub-regions (*e.g., each sub-pixel sample area forms a sub-region and therefore each sampling location lies at the center of a sub-region; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 46:

The claim 46 encompasses the same scope of invention as that of claim 42 except additional claimed limitation of the two sample locations located in the second and third rows of the array of sub-regions. However, Sato further discloses the claimed limitation of the two sample locations located in the second and third rows of the array of sub-regions (*see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 47:

The claim 47 encompasses the same scope of invention as that of claim 446 except additional claimed limitation of the two sample locations located substantially at the center of

respective sub-regions. However, Sato further discloses the claimed limitation of the two sample locations located substantially at the center of respective sub-regions (*e.g., each sub-pixel sample area forms a sub-region and therefore each sampling location lies at the center of a sub-region; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 48:

The claim 48 encompasses the same scope of invention as that of claim 46 except additional claimed limitation of the two sample locations located at the center of respective sub-regions. However, Sato further discloses the claimed limitation of the two sample locations located at the center of respective sub-regions (*e.g., each sub-pixel sample area forms a sub-region and therefore each sampling location lies at the center of a sub-region; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claims 86:

The claim 86 encompasses the same scope of invention as set forth in claim 1 except additional claimed limitation of sampling at only two sample locations relative to a pixel in accordance with a sampling pattern and an apparatus for rendering of an image. However, Sato further discloses the claimed limitation of sampling at only two sample locations relative to a pixel in accordance with a sampling pattern and alternating along the y-axis (*e.g., Fig. 32*) and an apparatus for rendering of an image (*see Figs. 2-22*).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. U.S. Pat. No. 6,731,301 (hereinafter Sato) in view of Wong et al. U.S. Pat. No. 6,501,483 (hereinafter Wong).

Re Claims 29-32:

The claims encompass the same scope of invention as that of claim 27 except additional claimed limitation of the first sampling rate being two samples per pixel and the second sampling rate being one sample per pixel.

Wong teaches at the block 542 of Fig. 7, selecting a sampling pattern from a plurality of sampling patterns shown in figures 5A-5L, and based on the super-sample pattern utilized, the location of the sub-pixel associated with each super-sample is determined according to the pattern shown in figures 5A-5L.

It would have been obvious to one of ordinary skill in the art to have incorporated the Wong's super-sampling patterns into the Sato's pattern table to select sampling patterns for pixels because Sato teaches selecting a sparse sampling pattern in accordance to the predetermined condition such as the selection by the random number generator or a pattern table (*see Sato Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*) and therefore suggesting two different sampling patterns can be selected for consecutive pixels. Moreover, Wong teaches non-

uniform sampling patterns and non-uniform pixel changes and further teaches that the determination of the appropriate super-sampling pattern to use is somewhat subjective (e.g., Wong column 5, lines 49-67) and therefore suggesting two different sampling patterns can be selected for consecutive pixels.

One having the ordinary skill in the art would have been motivated to do this because it would have provided a routine experimentation of the test sampling patterns to possibly reduce visible or invisible aliasing noise or to reduce signal to noise ratio by employing the alternating sampling patterns for the consecutive pixels (*see Sato Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

Claims 65-66, 72-75, 77, 79, 81, 83, and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. U.S. Pat. No. 6,731,301 (hereinafter Sato) in view of Don P. Mitchell, "Generating Antialiased Images at Low Sampling Densities", Computer Graphics, Vol. 21, No. 4, July 1987, pp. 65-72 (hereinafter Mitchell).

Re Claims 65-66, 72-75, 77, 79, 81, 83, and 85:

The claims encompass additional claimed limitation of selecting the one sampling pattern comprising randomly selecting one sampling pattern from the plurality of patterns.

Sato is silent to the claimed limitation of selecting the one sampling pattern comprising randomly selecting one sampling pattern from the plurality of patterns.

However, Mitchell teaches a non-uniform or adaptive sampling patterns with variations in local sampling densities for super-sampling cells or pixel regions or pixels and the sampling pattern is randomly selected (e.g., Mitchell page 67-68).

To illustrate how Mitchell's teaching can be used to construct the sampling pattern for a given pixel determined by a calculation based upon the row and/or column containing the pixel, Mitchell discloses each new sampling location is generated if it falls outside a certain distance of any previously chosen sampling locations in super-sampling (Mitchell page 66) and an offset can be added to the sample positions to generate new sampling pattern (Mitchell page 66). Mitchell further discloses a reconstruction filter which determines the number and locations of the sampling points and thereby determines the sampling pattern for each pixel because the filter kernel is pixel position and sampling location dependent (Mitchell page 67). Therefore, Mitchell teaches the sampling density can be constructed to change with respect to pixel positions in a way that can be determined by the filter kernel function of the pixel position. Therefore, by using the sampling location selection scheme or by the filter kernel selection, Mitchell's teaching may generate varying sampling densities such as the sampling pattern for a given pixel determined by a calculation based upon the row and/or column containing the pixel.

It would have been obvious to one of ordinary skill in the art to have incorporated the Mitchell's non-uniform or adaptive sampling for super-sampling cells into the Sato's invention to select sampling patterns for pixels because Sato teaches selecting a sparse sampling pattern in accordance to the predetermined condition such as the selection by the random number generator or a pattern table (see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14) and therefore suggesting two different sampling patterns can be selected for consecutive pixels. Moreover,

while it is known to one of the ordinary skill in the art that super-sampling yields less aliasing, however, Applicant apparently fails to establish the criticality of the specific way of non-uniform or adaptive sampling using two different sampling patterns for consecutive pixels.

One having the ordinary skill in the art would have been motivated to do this because it would have provided a routine experimentation of the test sampling patterns to possibly reduce visible or invisible aliasing noise or to reduce signal to noise ratio by employing the non-uniform sampling patterns for the different pixels (e.g., Mitchell page 66-68).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jin-Cheng Wang whose telephone number is (571) 272-7665. The examiner can normally be reached on 8:00 - 6:30 (Mon-Thu).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kee Tung can be reached on (571) 272-7794. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jcw